Emerging Threats and Challenges in Diagnosis and Management of Chikungunya

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Chikungunya

- CHIKV Fever
- Buggy Creek virus infection
- Knuckle fever
- Me Tri virus infection
- Semliki Forest virus infection

Chikungunya

- “Chikungunya” derives from a word in the Kimakonde language, meaning “to become contorted”, and describes the stooped appearance of sufferers with joint pain (arthralgia).

Chikungunya

- Vector borne disease
- Viral Diseases
- Infectious disease
- Behavioural disease
- No conventional diagnosis
- No cure
- No Vaccine

CHIKUNGUNYA

- Chikungunya is a mosquito-borne viral disease first described during an outbreak in southern Tanzania in 1952. It is an RNA virus that belongs to the alphavirus genus of the family Togaviridae.
- Chikungunya has been identified in over 60 countries in Asia, Africa, Europe and the Americas.

Chikungunya virus

It is a single-stranded RNA virus and is approximately 11.8 kb long with a capsid and a phospholipid envelope.

Phylogenetic analysis has revealed 3 distinct groups based on partial sequences of *NS4* and *E1*genes:

(1) the West African,

(2) the East-Central-South African (ECSA), and

(3) the Asian

Behavioural disease

Chikungunya in Bangladesh

- **No evidence of chikungunya virus in Bangladesh before 2008**
- **First identified outbreak of chikungunya in Bangladesh,2008.**

39 case in Rajshahi and Chapainawabganj

- **Chikungunya outbreak in 2011 in Dhaka**

Emerging threat

- The disease occurs in Africa, Asia and the Indian subcontinent. In recent decades mosquito vectors of chikungunya have spread to Europe and the Americas.
- In 2007, disease transmission was reported for the first time in a localized outbreak in north-eastern Italy. Outbreaks have since been recorded in France and Croatia.

ENVIRONMENT

- **Population explosion**
- **Deforestation**
- **Global warming**
- **Floods**
- **fast movement of population**

ENVIRONMENT

- **Emergence of world as single village**
- **Unplanned urbanization**
- **Inadequacy of sanitation,**
- **Improper disposal of garbage and pollution of aquatic systems**
- **Development of resistance in vectors to insecticides**

TRANSMISSION

- **This virus is transmitted only by mosquitoes**
- **The mosquito picks up the virus from an infected person during the viraemic period – within five days from the day of starting of symptoms**
- **An infected mosquito will remain infected all its life span and can transmit the virus each time it bites**
- **An infected person cannot spread the infection directly to other persons**

Chikunguniya Data - 2016

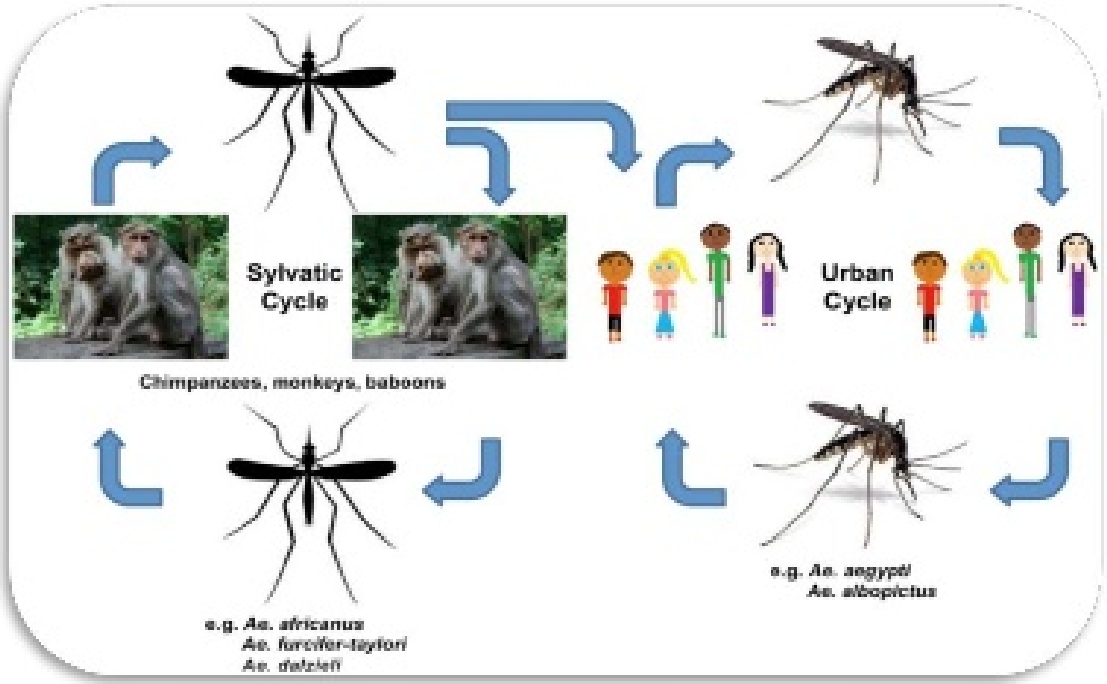
Year – 2016 Till 14-12-2016	Total Cases	Deaths
Probable	0	0
Confirm	209	25
Total	209	25

Dengue Cases- 2016

Year – 2016 Till 14-12-2016	Total Cases	Deaths
Probable	354	25
Confirm	261	21
Total	615	46

Disease Transmission

- **Human Incubation Period:** 1-12 days (Average 3-7 Days), following bite of an infected mosquito
- **Mosquito Incubation Period:** Average 7-10 days; Once infected has virus until death (30 days)



Reference: Thiboutot M., et al., (2010). Chikungunya: A Potentially Emerging Epidemic. *Neglected Tropical Diseases, 4 (4).* Retrieved from: http://www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0000623 on October 20, 2015.

No conventional diagnosis

Diagnostic Testing

Diagnostic Assay	Timing for Diagnostic Assays/Days Post-Illness Onset
Viral Culture*	≤ 3 days
RT-PCR	≤ 8 days
IgM antibody tests	≥ 4 days (Up to several months after onset)

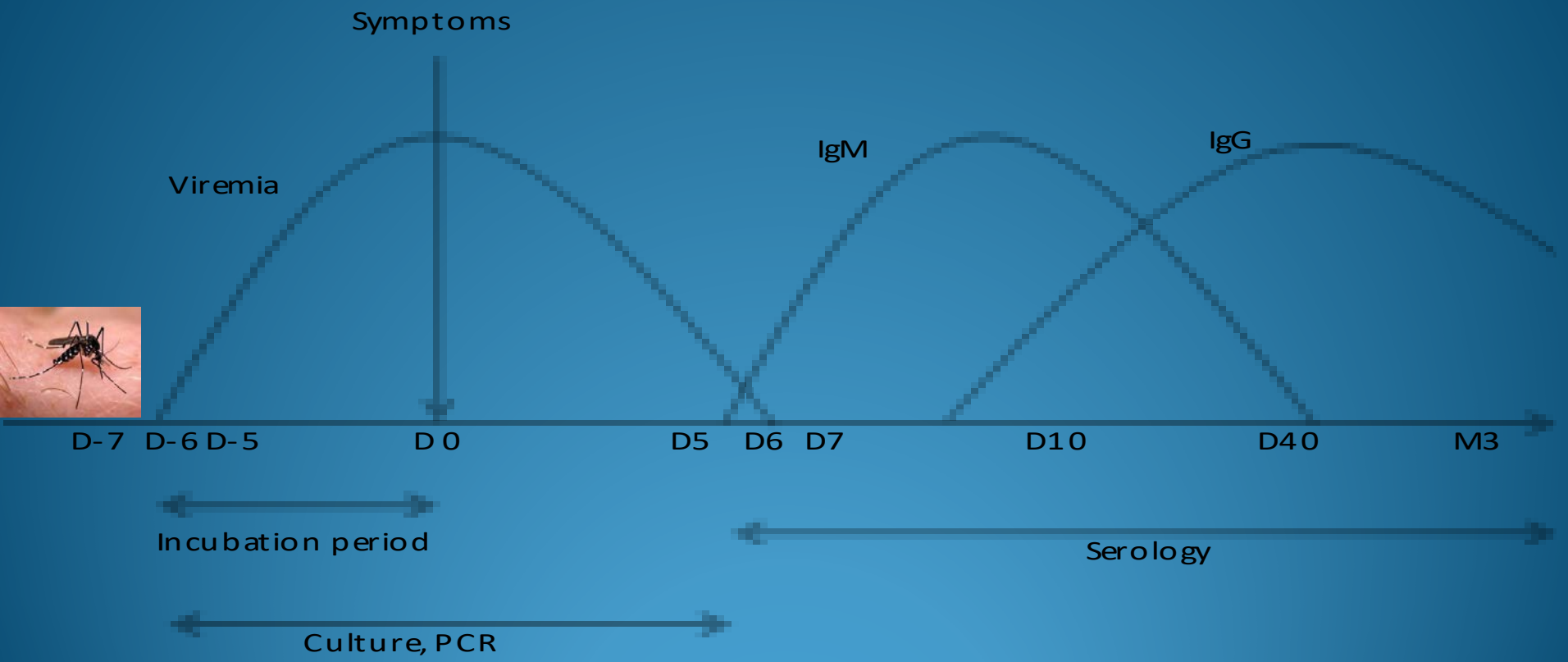
*Virus should be handled under biosafety level 3 conditions

Where is testing performed?

- CDC Arboviral Diseases Branch
- Several State Health Departments
- One Commercial Laboratory (Focus Diagnostics)

- Demonstrating four fold or greater rise in antibody titre
- The antibody titre will positive after 5th day of illness only

Diagnostic challenges in Chikungunya

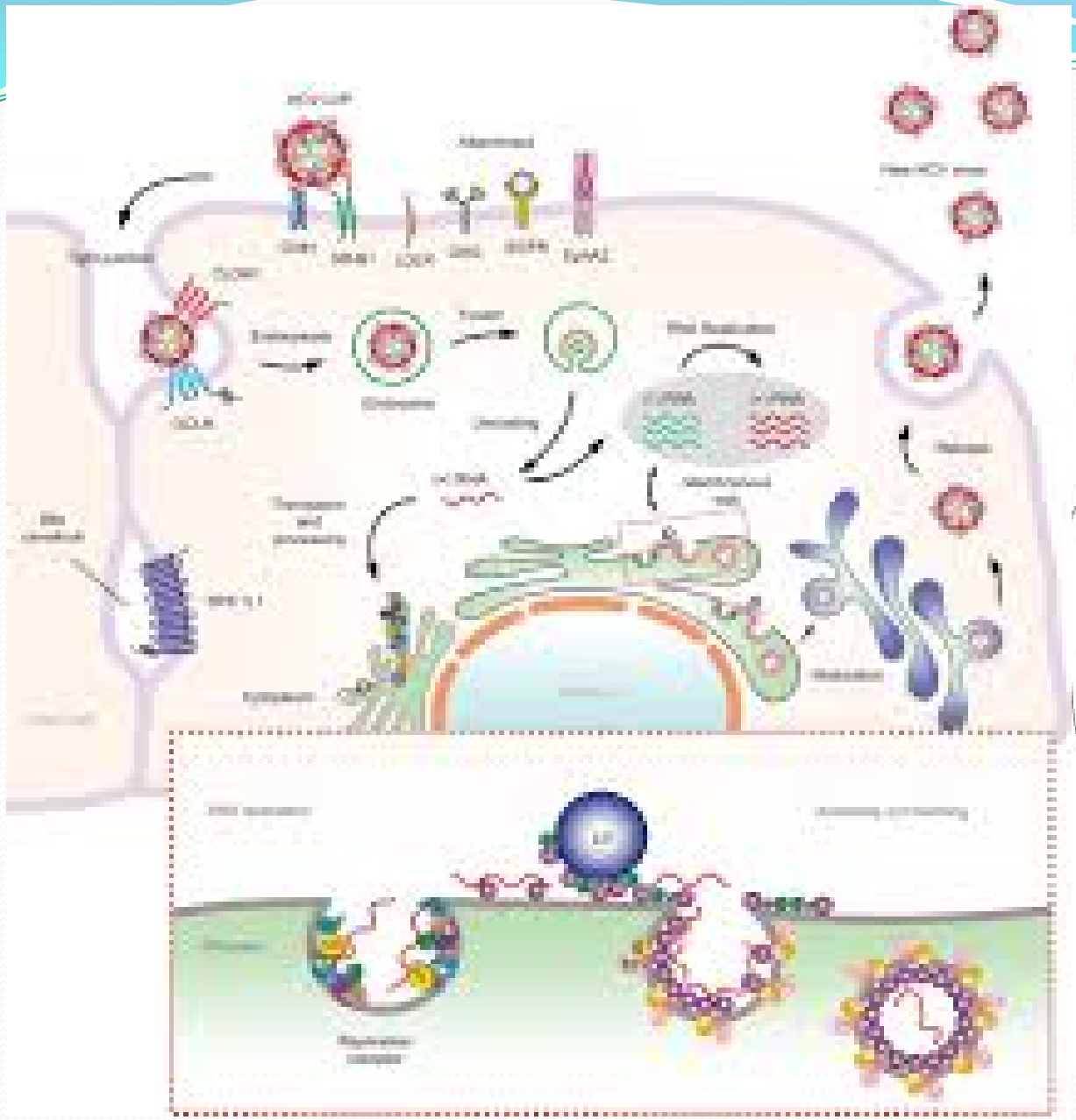


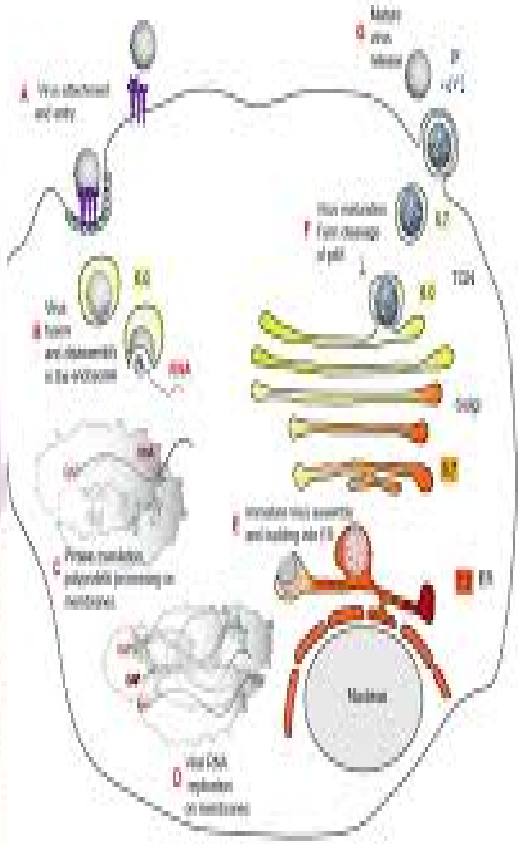
Diagnostic challenges

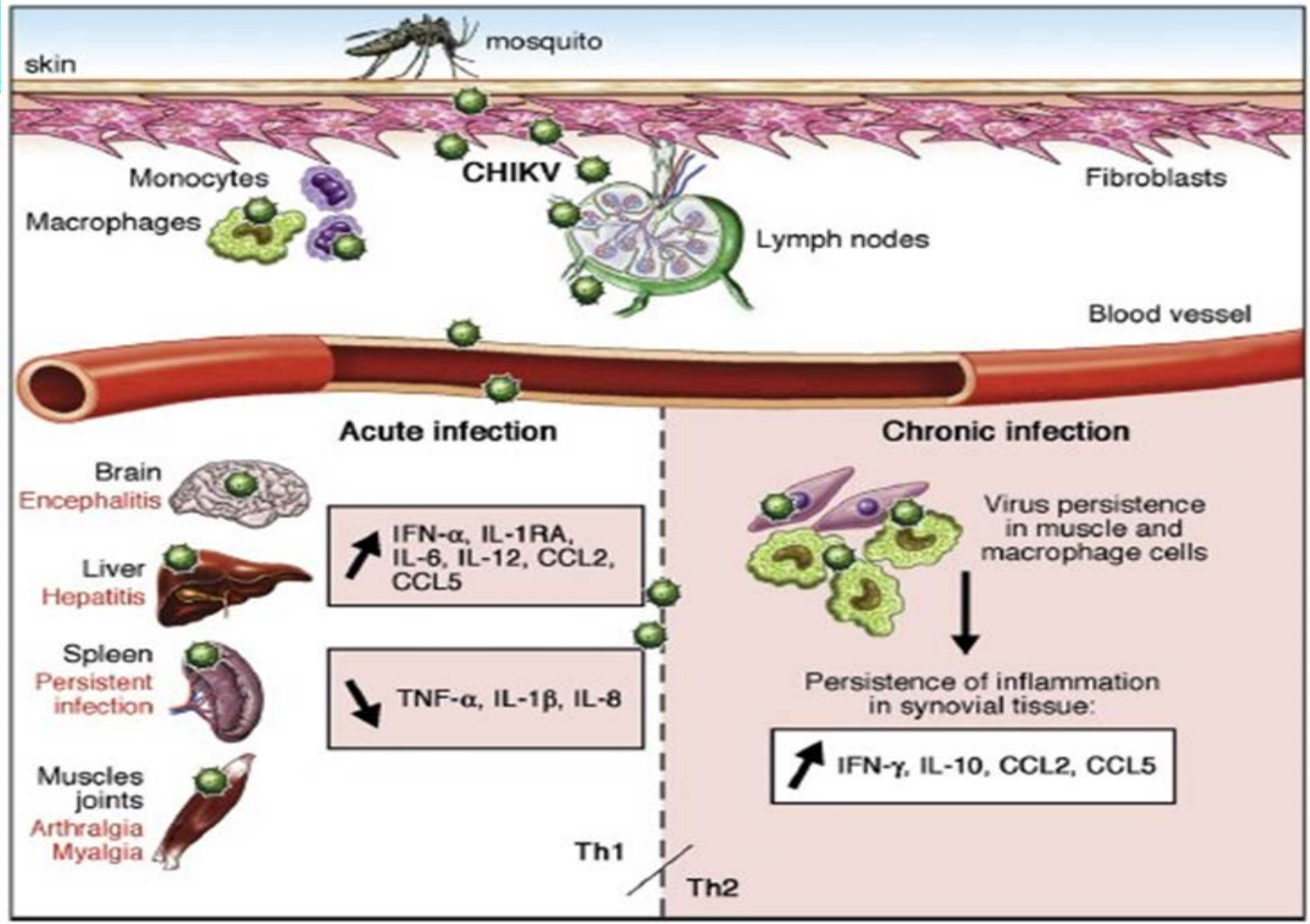
- Suspected cases
- Probable cases
- Confirmed cases:
  - Four fold rise of HI antibody
  - IgM
  - Virus isolation
  - RT-PCR
- WHO criteria:
  - Clinical criteria
  - Epidemiological criteria(<15 days)
  - Laboratory criteria: One of the above tests +ve

Clinical diagnosis and challenges

- Asymptomatic : 3-25%
- Fever, Arthralgia and rash
- Biphagic : 2-3 days afebrile inbetween
- Arthralgia: 80% (Acute, Sub-Acute and chronic)
- Myalgia: 40-50%
- Rash: common
- Neutropenia: possible
- Thrombocytopenia: Possible
- Lymphopenia: common

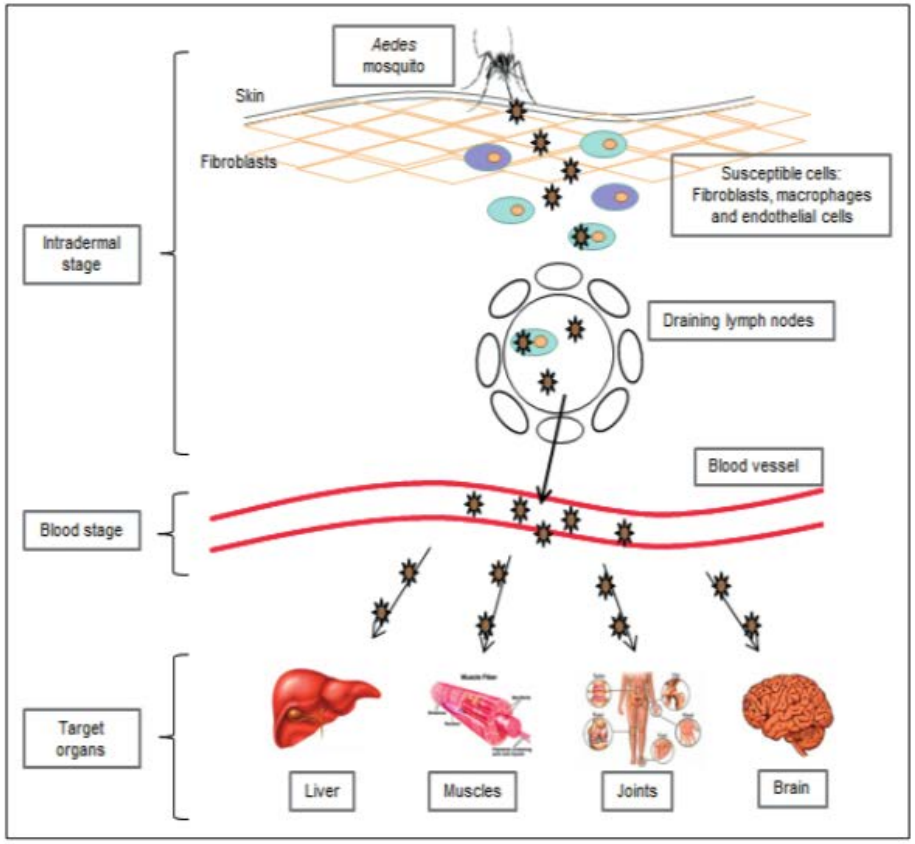



Nucleus


skin
mosquito
Monocytes
Macrophages
CHIKV
Fibroblasts
Lymph nodes
Blood vessel
Acute infection
Chronic infection
Brain
Encephalitis
Liver
Hepatitis
Spleen
Persistent infection
Muscles joints
Arthralgia
Myalgia
IFN-α, IL-1RA, IL-6, IL-12, CCL2, CCL5
TNF-α, IL-1β, IL-8
Virus persistence in muscle and macrophage cells
Persistence of inflammation in synovial tissue:
IFN-γ, IL-10, CCL2, CCL5
Th1
Th2

Clinical challenges

- The disease shares some clinical signs with dengue, in areas where dengue is



Management

- Management of Patients :
- Management of Chikungunya

Management

- Management of Patients:
  - Target human
    - Virus
    - Inflammatory damage caused by virus
    - Symptoms`/systemic/organ specific

Management of Chikungunya

- Target:
  - Mosquito
  - Waterbodies
  - Road and building
  - Media education
  - Human
  - Prevention and control strategies : spray, fogging
  - Non-vectorial transmission
    - Blood transfusion
    - Body fluid contact
    - MTCT
    - Sexual transmission

Treatment

- There are no specific treatments for chikungunya. There is no vaccine currently available. Chikungunya is treated symptomatically
- No cure: No Antiviral Drugs
- Symptomatic treatment:
  - Fever
  - Acute Arthritis
  - Rash

  Treatment of Complications

  Treatment of Chronic Arthritis

Treatment

- Body immunity clears the virus with in 4-5 days from the body.
- Role of Antiviral drugs for the treatment of Chik..
- Role of steroid:
- Use of NSAIDS
- Use of HCQS
- Use of Biologics
- Use of DMARDS

Treatment

- Chronic arthritis:
- Joint pain is often debilitating and can vary in duration.
  - NSAIDS
  - Chloroquine is gaining ground as a possible treatment

Treatment of sequelae: A challenging task.

- Chronic musculoskeletal disorder
- Emotional disorder
- Neurological disorder
- Dermatological disorder

Vaccine

- Still a Dream for all

Thank you